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Introduction: Man Bac Biological Research Objectives

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The principle aim of this volume is the examination and elucidation of the human biology of the Man Bac cemetery population and associated faunal assemblages, in order to reveal the micro-evolutionary history, palaeohealth, local palaeo-environmental conditions, subsistence strategies and general life-ways of this ancient community. Building on previous Man Bac research we wish to provide a wealth of new information about population history, colonisation, diet, nutrition, adaptive shifts, and specific and general aspects of health in the current volume.

Quantitative and qualitative cranio-dental analyses will speak to a complex population history involving both migration and *in situ* development. Ancient mitochondrial DNA investigations will reveal at least one piece of the genetic landscape during this period, helping to shed light on Man Bac's place in debates over the origins of present day Southeast Asian populations.

An investigation of long bone morphology will provide important information on antemortem life styles related to physical activities, while explorations of ancient patterns of health and past demographic trends at Man Bac will sketch a picture of the history of human wellbeing and behaviour in the region.

Work on the faunal remains will reveal a subsistence base rich in both terrestrial and aquatic resources with the differential targeting of certain terrestrial mammals and marine resources, alluding to the complexity of their hunting and gathering behaviours and abilities. Further, the analysis of age distributions for *Sus* remains will provide evidence for the initial stages of the domestication of pigs in the region.

The human and non-humans of Man Bac specifically dealt with in this volume will provide an informative database in developing, reconstructing and interpreting the lives of the first food producers in this region.

Man Bac is one of the best cemetery/habitation sites in Vietnam for investigating questions regarding genetic history, health, disease, environment, social systems and identity, as well as a wide range of other factors, in detail. Previous publications have already revealed evidence for an age-based social hierarchy (Oxenham et al., 2008a), sophisticated system of palliative care (Oxenham et al., 2009) and the expression of social identity, including that of children, through complex mortuary practices (Oxenham et al., 2008b). Further, preliminary analysis of cranial and dental morphometric data recorded from skeletons of the earlier

excavation seasons (1999-2005) suggests the existence within Man Bac of immigrants, which may prove to be of crucial importance in debates concerning the population history of this region (Matsumura et al., 2008).

MAN BAC: THE SITE

An exhaustive account of the palaeoenvironment and archaeology of Man Bac will be detailed in a subsequent publication. Here, the environment, geography and archaeology of the site are summarised. The site of Man Bac is located in Yen Mo district, Ninh Binh province, northern Vietnam (109° 59' 17" East and 20° 08' 00" North) (Figure 1.1). Man Bac is approximately 25km from the coast and surrounded by karst limestone mountains. The following summary of the current climate and environment of Vietnam, while not necessarily representative of the situation two to three thousand years ago, does, however, serve as an approximation to conditions in the past.

Topographically, while about three-quarters of Vietnam can be described as mountainous, 85% of these are below 1000m in elevation. Vietnam has three plains systems that are still in the process of expansion. [Man Bac] situated in the low lying northern Bac Bo plain and fall[s] between latitude 18° and 22° north. Vietnam presents two distinct climatic zones, a northern and a southern. Northern Vietnam has two seasons, cold and hot but with high levels of humidity occurring during both periods. Further, the north experiences marked climatic variability or instability that has restricted levels of ecological variation in comparison to southern Vietnam. The country is prone to typhoons and has experienced over 400 during the last one hundred years. Storms are also very frequent with winds reaching up to 50 m/sec. This in combination with rainfall in excess of 600mm in a 24 hour period can lead to extensive agricultural and human disruption. Because the Bac Bo region is essentially subtropical, tropical forests are found only below about 500m while more tropical flora is only found below some 300m. Around the coastal regions mangroves still predominate, while dense bamboo forests are common all over the northern plains. The north is home to a diverse range of bird, riverine and marine life. Some 900 species of fish are recognized in the Gulf of Bac Bo alone. Terrestrial animals such as sambar deer, muntjac, chamois and numerous arboreal primates are still common in the region. In the past elephant, rhinoceros, tiger, and panther were also common.

(Oxenham 2006:212-213)

The excavation history of this approximately 2m deep deposit is as follows: Vietnam Institute of Archaeology and Ninh Binh Museum in 1999 (30m², 6 burials); the same group in 2001 (30m², 11 burials); the same group in collaboration with the Sapporo Medical University and Australian National University in 2004-5 (36m², 35 burials); and finally by the same multi-national team in 2007 (pit H1 12m² 15 burials, pit H2 24m² 32 burials) (Cuong, 2001; Phung, 2001; Hiep and Phung, 2004; Nishimura, 2006, Oxenham et al. 2008a, Matsumura et al. 2008). Figure 1.2 shows both the 2005 excavation and the history of excavation at the site. Figure 1.3 indicates the high concentration of burials in the western part of the site during the 2007 excavations. Figure 1.4 provides a schematic burial plan for all four seasons. Colour coding provides information on the age structure and distribution (within

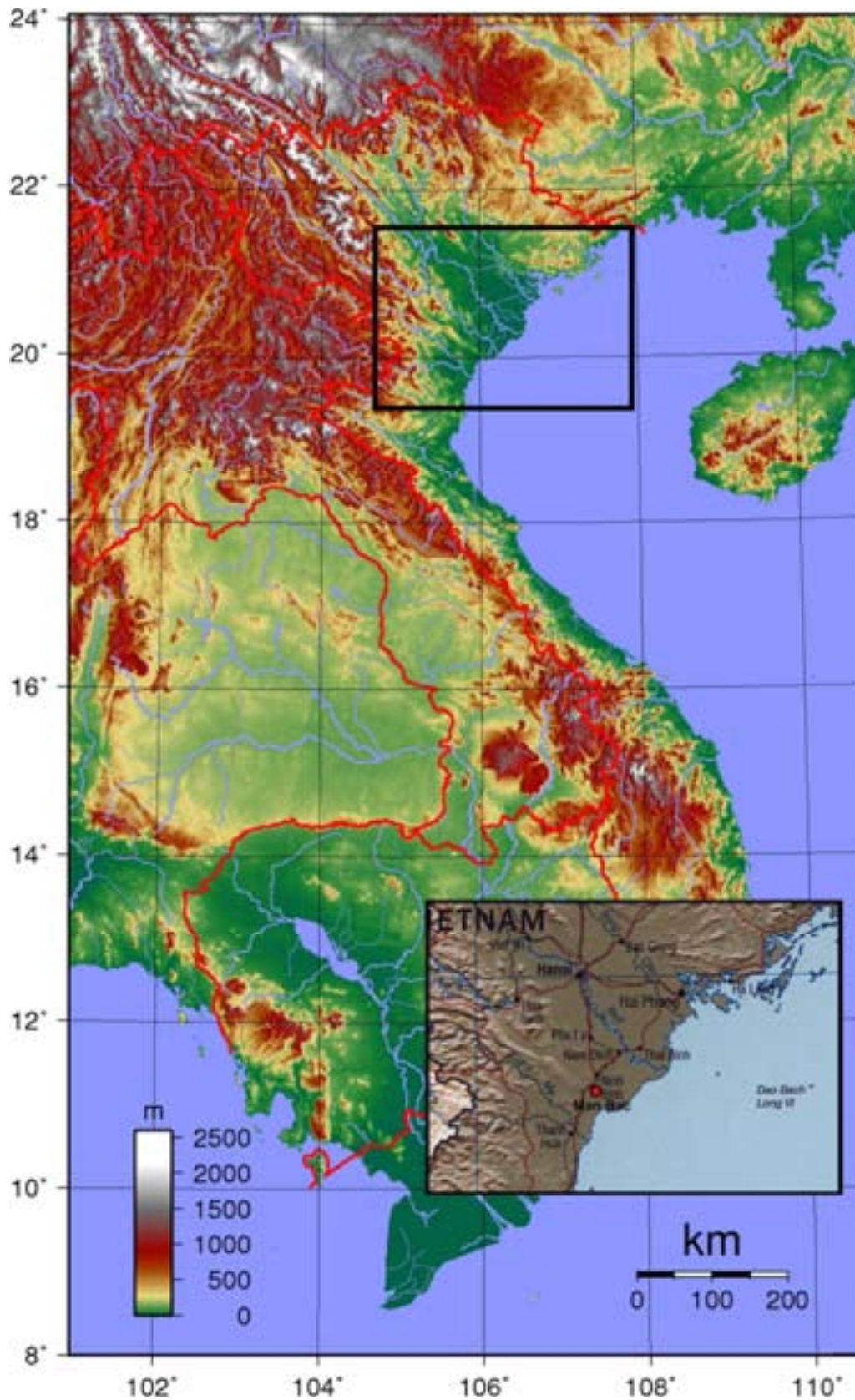


Figure 1.1 Topographic map of Vietnam and location of Man Bac (inset lower right) on the southern edge of the Red River Delta (map source: Sadalmelik; inset source: Wiki.verkata).

the cemetery) of the sample (see Chapters 2 and 3 for more details), while the orientation of the burials are represented by the long axes of the ellipses (the majority of burials were oriented approximating east-west with the head in the east). Regarding the actual size of the original settlement,

[i]t is difficult to determine the extent of the site, primarily due to subsequent terracing and the development of a catholic cemetery to the east of the site in the historic period, but it likely approximates 200-300m². Preliminary analyses suggest that two distinct cultural phases are associated with three stratigraphic levels: the upper two units being occupation phases and the third (bottom) layer being almost exclusively burials in otherwise sterile silt. Material cultural similarities between the occupation layers and grave inclusions in the third level suggest the burials are associated with the occupation level(s).
Oxenham et al. (2008b:191)

A number of C14 dates on charcoal [2 sigma range calibrations (INTCAL04) after Reimer et al. (2004)] sandwich the occupation and burial layers quite narrowly: 3,341±38 BP (1,737-1,524 BC); 3,393±36 BP (1,775-1,608 BC); 3,560±30 BP (2,066-1,775 BC) (Oxenham et al. 2008b:192; see Appendix 2 in this monograph for a complete list of dates). In terms of the local cultural chronologies, the material culture displays many similarities with the Phung Nguyen period (4,000-3,500 years BP), whose culture flourished in the north of Vietnam along the upper reaches of the Red River Delta. The Phung Nguyen culture period, and indeed Man Bac to a greater or lesser extent, is generally associated with evidence for agriculture, land clearance, ceramic manufacture, hunting, marine resource gathering, extensive and far reaching trade networks, and local food production (although Man Bac lacks hard evidence for rice agriculture) (Hiep and Phung, 2004; Nishimura, 2006).

TERMINOLOGY

Following the convention established in Oxenham and Tayles (2006) the term 'neolithic' is rendered in lower case. The principle reason for this is the general unsuitability of a term which has a raft of connotations specific to archaeological culture chronologies in Europe and the Near East. Additionally, 'neolithic' implies a definitional precision lacking in Southeast Asian archaeology. How the term 'neolithic' may be tentatively used in a Southeast Asian archaeological context is discussed in more detail in Chapter 12. For the purposes of the following chapters, 'neolithic' refers to Southeast Asian food-producing communities that lacked evidence for metal.

Geographic terminology is crucial to the issues discussed in this volume because many researchers who argue for the *in situ* evolution of indigenous Southeast Asians include south China in their definition of prehistoric Southeast Asia (e.g., Turner, 1995). Although such a definition does have certain advantages (Solheim, 1985), in this study we use the separate designations of East and Southeast Asia: "East Asia" refers to modern China, Taiwan, North and South Korea, Japan, Mongolia, and the Russian Far East; "Southeast Asia" includes modern Myanmar (Burma), Thailand, Vietnam, Laos, Cambodia, Malaysia, Singapore, Indonesia, Brunei, the Philippines, and the Andaman and Nicobar Islands. In choosing this

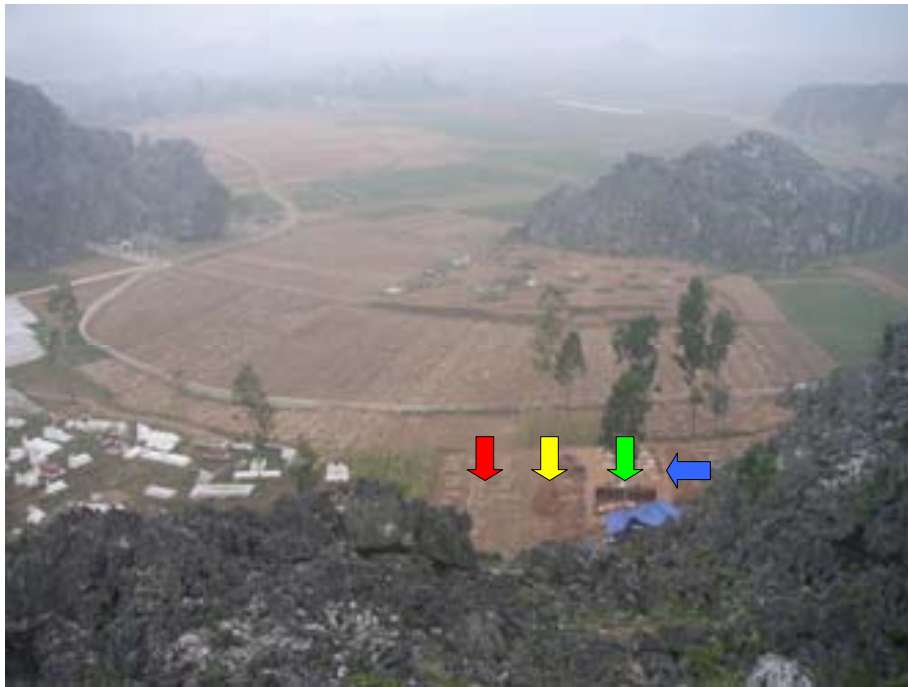


Figure 1.2 View of Man Bac looking south. Note modern catholic cemetery to the east (left in picture) of the excavated area. Arrows show excavation history: red 1999, yellow 2001, green 2004/5 (open excavation square seen), blue 2007.



Figure 1.3 View of 2007 pit H2, looking east. There was a high concentration of burials of all ages from neonate, to infant to adult in this 30m² trench.

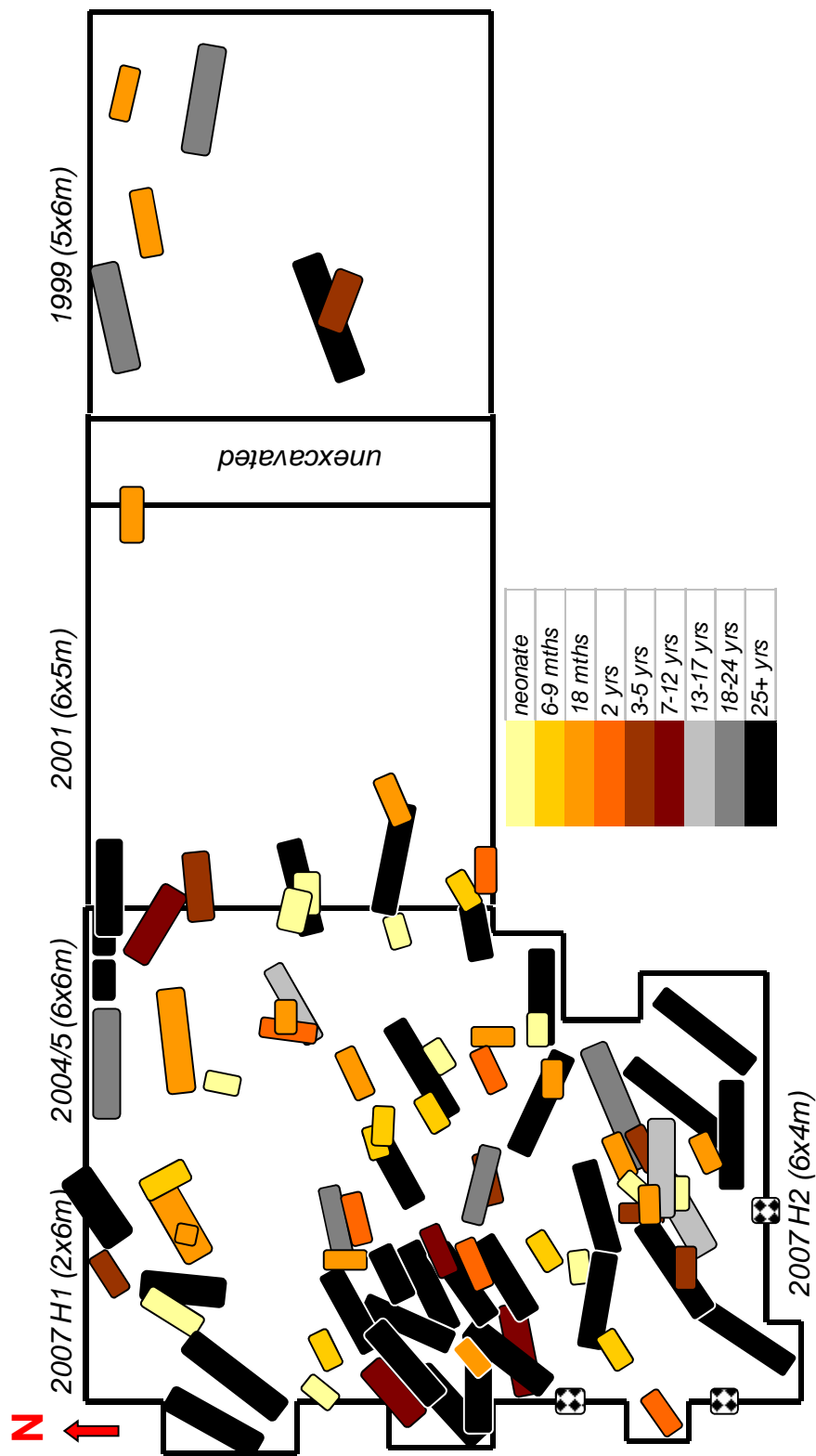


Figure 1.4 Schematic burial plan for all seasons of excavation at Man Bac (after Oxenham 2006, 2009).

terminology, we are aware that the concept of “Asia” itself is a Western one which maps that which is “non-European” and thus lacks geographic or historical precision (Chaudhuri, 1990, p.22-23), nonetheless it has a heuristic value.

MONOGRAPH STRUCTURE

The following Chapter (2) explores the demography of the sample as well as explaining the chief methodological protocols employed for age-at-death and sex assessment of the human sample. Chapters 3 through 5 analyse the cranio-dental morphology of the sample using both quantitative and qualitative techniques with the aim of elucidating the micro-evolutionary history and phenotypic relationships of the Man Bac population within the local and larger region. Chapter 6 explores stature at Man Bac and regionally, as well as looking at long bone cross-sectional morphology. Chapter 7 explores certain aspects of the health of the Man Bac inhabitants, particularly with respect to oral disease and two signatures of physiological well-being (enamel hypoplasia and cribra orbitalia). In Chapter 8 an analysis of ancient mtDNA haplotypes helps elucidate the genetic relationships of the Man Bac population with local and more distant populations. Chapter 9 assesses the mammalian vertebrate assemblage and discusses the evidence for pig domestication and the contribution of hunting to the economy. Following this, Chapter 10 examines the fish assemblage and discusses the habitats and species targeted by the ancient Man Bac community. Finally, Chapter 11 synthesises the finding of the preceding chapters and places Man Bac into a broader interpretive context. Three large appendices are included; the first describes the mortuary context of each burial, in addition to age-at-death and the sex of each burial; the second describes and illustrates the mortuary pottery and the third appendix describes the state of preservation of each burial and details the cranial and postcranial morphology of the adult remains.

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